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## (54) ADHESIVE FILM FOR FPC REINFORCING SHEET

## (57)Abstract:

PROBLEM TO BE SOLVED: To provide an adhesive film for FPC reinforcing sheet having good adhesive properties, long-term heat resistance and heat resistance for soldering.

SOLUTION: The good adhesive properties and long-term heat resistance can be achieved by a film comprising a soluble thermoplastic polyimide resin made of an ester acid dianhydride of a specific structure and a diamine, a thermoset resin and its curing agent. The adhesive film for FPC reinforcing sheet having the good heat resistance for soldering can be obtained by using a solvent of cyclic ether.

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## CLAIMS

## [Claim(s)]

[Claim 1] The adhesive film for the flexible printed circuit board back up plate both whose bond strength after 150 degrees C and 1000-hour maintenance it is an adhesive film for pasting up the back up plate of a flexible printed circuit board, and the bond strength of the film when carrying out the laminating of the non-thermoplasticity polyimide film to aluminum plate through this adhesive film is 5 or more N/cm, and is 5 or more N/cm.

[Claim 2] The adhesive film for the flexible printed circuit board back up plate according to claim 1 whose back up plate of said flexible printed circuit board is a metal plate.

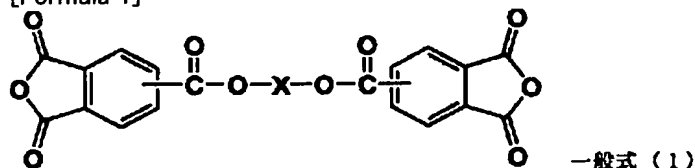
[Claim 3] The adhesive film for the flexible printed circuit board back up plate according to claim 1 or 2 said whose adhesives nature film for the flexible printed circuit board back up plate is what is used for adhesion with the cover lay of a flexible printed circuit board, and the back up plate of a flexible printed circuit board.

[Claim 4] The adhesive film for the flexible printed circuit board back up plate according to claim 3 said whose cover-lay film is a polyimide film.

[Claim 5] The adhesive film for the flexible printed circuit board back up plate according to claim 3 said whose cover-lay film is a non-thermoplasticity polyimide film.

[Claim 6] It is polyimide with which said adhesive film consists of at least 50% of the weight or more of fusibility thermoplasticity polyimide components, and this thermoplastic polyimide uses acid 2 anhydride as a raw material, and more than 50 mol % of all acid 2 anhydride is a general formula (1).

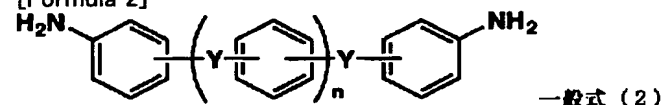
## [Formula 1]



(— X shows the radical of the bivalence containing  $-(CH_2)_k-$  or a ring among a formula, and k is or more 1 ten or less integer.) — adhesive film for the flexible printed circuit board back up plate given in any 1 term of claims 1-5 characterized by being ester acid 2 anhydride expressed.

[Claim 7] Ester acid 2 anhydride and the following general formula (2) to which said thermoplastic polyimide is expressed with said general formula (1)

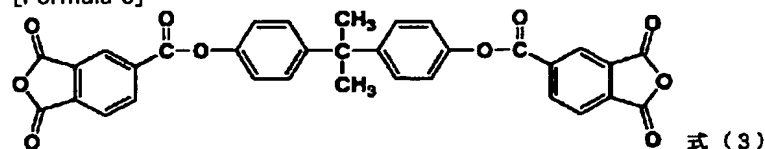
## [Formula 2]



the inside of a formula and Y are the same — or — differing  $-C(=O)-$ ,  $-SO_2-$ ,  $-O-$ ,  $-S-$ , and  $-(CH_2)-$  it is chosen out of  $m-$ ,  $-NHCO-$ ,  $-C(CH_3)_2-$ ,  $-C(CF_3)_2-$ ,  $-C(=O)O-$ , or single bond — association is shown in a kind at least. m and n are or more 1 five or less integers. Adhesive film for the flexible printed circuit board back up plate according to claim 6 characterized by being polyimide obtained considering the diamine compound expressed as a raw material.

[Claim 8] Said thermoplastic polyimide is the following type (3).

## [Formula 3]



The adhesive film for the flexible printed circuit board back up plate according to claim 7 characterized by being polyimide which comes out and is obtained considering ester acid 2 anhydride expressed and the diamine compound expressed with said general formula (2) as a raw material.

[Claim 9] The adhesive film for the flexible printed circuit board back up plate according to claim 1 to 8 obtained

from the fusibility thermoplasticity polyimide system adhesives which mix a curing agent with thermosetting resin to said fusibility thermoplastic polyimide, and are obtained.

[Claim 10] The adhesive film for the flexible printed circuit board back up plate according to claim 9 characterized by thermosetting resin being epoxy system resin.

[Claim 11] The adhesive film for the flexible printed circuit board back up plate according to claim 9 or 10 with which said fusibility thermoplasticity polyimide system adhesives are the solutions of the adhesives which come to contain an organic solvent, and said organic solvent contains 30% of the weight or more of a cyclic ether system solvent.

[Claim 12] The adhesive film for the flexible printed circuit board back up plate characterized by casting or applying fusibility thermoplasticity polyimide system adhesives according to claim 9 to 11 on a base material, and tearing off and obtaining the adhesive film after desiccation from a base material.

[Claim 13] The adhesive film for the flexible printed circuit board back up plate characterized by casting or applying at least to one side of a polyimide film, drying after that, and obtaining a fusibility thermoplasticity polyimide system adhesives solution according to claim 9 to 11.

[Claim 14] The adhesive film for the flexible printed circuit board back up plate given in any 1 term of claims 6-13 whose fusibility thermoplasticity polyimide system adhesives layers are 5-50 micrometers.

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DETAILED DESCRIPTION

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## [Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the fusibility thermoplasticity polyimide system adhesive property film used for the back up plate of a flexible printed circuit board application, and the lamination of FPC.

[0002]

[Description of the Prior Art] In recent years, advanced features of electronic equipment, high-performance-izing, and a miniaturization are progressing, and the miniaturization to the electronic parts used in connection with them and lightweight-ization have been called for. Therefore, high density and what is highly efficient and highly efficient have come to be called for more also for the wiring material or wiring components which mount the semiconductor device package approach and them. Especially, the need of flexible printed wiring board ingredients, such as high-density-assembly ingredients, such as a semiconductor package, COL and a LOC package, and MCM (Multi Chip Module), and a multilayer flexible printed circuit board, is being extended.

[0003] Although a flexible printed circuit board (it calls Following FPC) is thin and it has the description that bending mounting is possible, since it is inferior to rigidity compared with a common resin substrate, reinforcing by sticking a resin substrate, a resin film, etc. using an adhesive film is performed. In this field, a phenol system, an epoxy system, and acrylic adhesives are used. In recent years, use for the application exposed to the bottom of elevated temperatures, such as an engine control unit and a plasma display application, is called for, for such an application, the work as a heat sink is called for in addition to a role of the back up plate, and the metal back up plate, such as aluminum plate, is used increasingly.

[0004] As adhesives which have the thermal resistance which is not in the conventional adhesive film in connection with it, the adhesives of a polyimide system are used gradually. Since it excels in thermal resistance also in various organic polymers, to space and the aeronautical-navigation field, polyimide is used broadly and used also as a charge of a binder. However, heat-resistant high polyimide system adhesives require the elevated temperature around 300 degrees C, and the high-pressure force, in order to paste up, and adhesive strength cannot say them with it being so high, either. Polyimide system adhesives have still higher water absorption, and it poses a problem that it is inferior to properties, such as solder thermal resistance.

[0005]

[Problem(s) to be Solved by the Invention] this invention persons solve the above-mentioned technical problem, and are excellent in solder thermal resistance, and it aims at offering the adhesive film for pasting up an adhesive property and the FPC back up plate which is excellent in thermal resistance over a long period of time. Especially then, as the back up plate When the laminating of the cover-lay film with which the adhesive property at the time of using a metal plate is good with the film, and consists of a metal plate, a polyimide film, etc. through an adhesive film further is carried out, As a result of a cover-lay film's doing [ an adhesive property ] reinforcement \*\*\*\* research about the good adhesive film for the FPC back up plate as for a metal plate, it came to complete this invention.

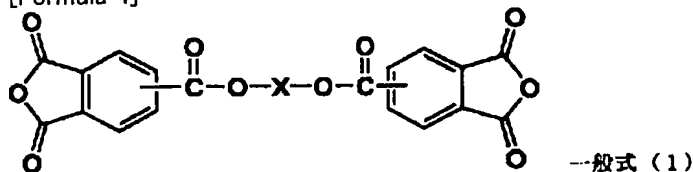
[0006]

[Means for Solving the Problem] This invention can attain the above-mentioned purpose with the following means.

- 1) The adhesive film for the flexible printed circuit board back up plate both whose bond strength after 150 degrees C and 1000-hour maintenance it is an adhesive film for pasting up the back up plate of a flexible printed circuit board, and the bond strength of the film when carrying out the laminating of the non-thermoplasticity polyimide film to aluminum plate through this adhesive film is 5 or more N/cm, and is 5 or more N/cm.
- 2) The adhesive film for the flexible printed circuit board back up plate given in one the given back up plate of said flexible printed circuit board is a metal plate.
- 3) 1 said whose adhesives nature film for the flexible printed circuit board back up plate is what is used for adhesion with the cover lay of a flexible printed circuit board, and the back up plate of a flexible printed circuit board, or the adhesive film for the flexible printed circuit board back up plate given in two.
- 4) The adhesive film for the flexible printed circuit board back up plate given in three said given cover-lay film is a polyimide film.
- 5) The adhesive film for the flexible printed circuit board back up plate given in 3 said whose cover-lay film is a non-thermoplasticity polyimide film.
- 6) It is polyimide with which said adhesive film consists of at least 50% of the weight or more of fusibility thermoplasticity polyimide components, and this thermoplastic polyimide uses acid 2 anhydride as a raw material, and more than 50 mol % of all acid 2 anhydride is a general formula (1).

[0007]

[Formula 4]

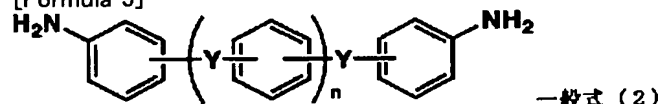


[0008] (— X shows the radical of the bivalence containing  $-(CH_2)_k-$  or a ring among a formula, and k is or more 1 ten or less integer.) — adhesive film for the flexible printed circuit board back up plate given in any 1 term of 1-5 which are characterized by being ester acid 2 anhydride expressed.

7) Ester acid 2 anhydride and the following general formula (2) to which said thermoplastic polyimide is expressed with said general formula (1)

[0009]

[Formula 5]

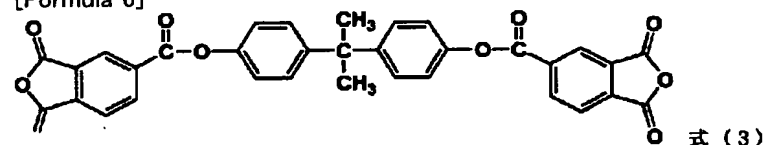


[0010] the inside of a formula and Y are the same — or — differing  $-C(=O)-$ ,  $-SO_2-$ ,  $-O-$ ,  $-S-$ , and  $-(CH_2)-$  — it is chosen out of  $m-$ ,  $-NHCO-$ ,  $-C(CH_3)_2-$ ,  $-C(CF_3)_2-$ ,  $-C(=O)O-$ , or single bond — association is shown in a kind at least. m and n are or more 1 five or less integers. Adhesive film for the flexible printed circuit board back up plate given in 6 characterized by being polyimide obtained considering the diamine compound expressed as a raw material.

8) Said thermoplastic polyimide is the following type (3).

[0011]

[Formula 6]



[0012] The adhesive film for the flexible printed circuit board back up plate given in 7 characterized by being polyimide which comes out and is obtained considering ester acid 2 anhydride expressed and the diamine compound expressed with said general formula (2) as a raw material.

9) The adhesive film for the flexible printed circuit board back up plate given in 1-8 which are obtained from the fusibility thermoplasticity polyimide system adhesives which mix a curing agent with thermosetting resin to said fusibility thermoplastic polyimide, and are obtained.

10) The adhesive film for the flexible printed circuit board back up plate according to claim 9 characterized by thermosetting resin being epoxy system resin.

11) The adhesive film for the flexible printed circuit board back up plate given in 9 or 10 in which said fusibility thermoplasticity polyimide system adhesives are the solutions of the adhesives which come to contain an organic solvent, and said organic solvent contains 30% of the weight or more of a cyclic ether system solvent.

12) The adhesive film for the flexible printed circuit board back up plate characterized by casting or applying the fusibility thermoplasticity polyimide system adhesives of a publication on a base material either 9-11, and tearing off and obtaining the adhesive film after desiccation from a base material.

13) The adhesive film for the flexible printed circuit board back up plate characterized by casting or applying at least to one side of a polyimide film, drying after that, and obtaining a fusibility thermoplasticity polyimide system adhesives solution given in 9-11.

14) The adhesive film for the flexible printed circuit board back up plate given in any 1 term of 6-13 whose a fusibility thermoplasticity polyimide system adhesives layer is 5-50 micrometers.

[0013]

[Embodiment of the Invention] The bond strength of a film when the adhesive film for the FPC back up plate of this invention carries out the laminating of the non-thermoplasticity polyimide film to aluminum plate through the adhesive film of this invention is 5 or more N/cm, and the bond strength after 150 degrees C and 1000-hour maintenance has become 5 or more N/cm. The adhesion sheet which was excellent also in thermal resistance over a long period of time which is expressed with the bond strength of 150 degrees C and 1000 hours after with the thermal resistance of polyimide can be obtained. Moreover, in order that the fusibility thermoplastic polyimide in this invention may show low absorptivity, the adhesive film excellent in solder thermal resistance is obtained.

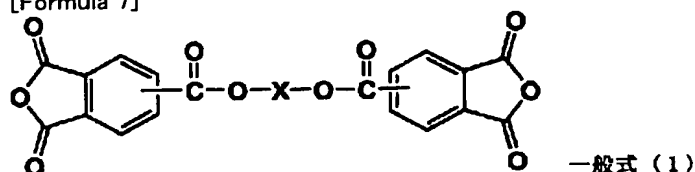
Furthermore, since the polyimide component is meltable to a solvent, a solution can be carried out, adhesives can be used and combination of the thermosetting resin for adhesive improvement is possible. As a solvent which can be used for a polyimide system adhesives solution, for \*\*\*\* reduction, a low-boiling point solvent is desirable and

cyclic ether system solvents, such as a tetrahydrofuran (THF), 1,4-dioxane, and dioxolane, may be preferably used from the field of the workability of an adhesive film at this time. Moreover, it is more desirable to contain a cyclic ether system solvent 50% of the weight or more preferably 30% of the weight or more for residual-solvent-content reduction, although it is more desirable to combine with a polar organic solvent when using the mixed organic solvent which mixed two or more solvents. In addition, as an organic polar solvent combined with a cyclic ether system solvent, acetamide system solvents, such as formamide system solvents [such as sulfoxide system solvents /, such as dimethyl sulfoxide and diethyl sulfoxide, /, N,N-dimethylformamide, N, and N-diethyl formamide, ], N,N-dimethylacetamide, N, and N-diethyl acetamide, are mentioned.

[0014] The thermoplastic polyimide of this invention is thermoplastic polyimide which uses acid 2 anhydride as a raw material, and more than 50 mol % of all acid 2 anhydride is a general formula (1).

[0015]

[Formula 7]

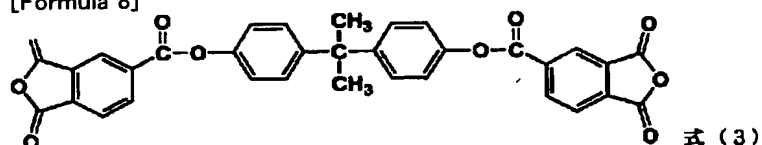


[0016] (— X shows the radical of the bivalence containing  $-(CH_2)_k-$  or a ring among a formula, and k is or more 1 ten or less integer.) — it is desirable that it is ester acid 2 anhydride expressed. If it has such structure, polyimide meltable to said organic solvent will be obtained.

[0017] As a desirable example of acid 2 anhydride expressed with a general formula (1) 2 and 2-screw (4-hydroxyphenyl) PUROPANJIBENZOETO -3, 3', 4, 4'-tetracarboxylic dianhydride, A p-phenylene screw (trimellitic acid monoester anhydride), 4, and 4'-biphenylene screw (trimellitic acid monoester anhydride), 1, 4-naphthalene screw (trimellitic acid monoester anhydride), 1, 2-ethylene screw (trimellitic acid monoester anhydride), 1, 3-trimethylene screw (trimellitic acid monoester anhydride), Although 1, 4-tetra-methylenebis (trimellitic acid monoester anhydride), 1, 5-pentamethylene screw (trimellitic acid monoester anhydride), 1, and 6-hexa methylenebis (trimellitic acid monoester anhydride) etc. is mentioned From the point that the fusibility of the polyimide obtained is good, and that balance with thermal resistance is good to a formula (3)

[0018]

[Formula 8]

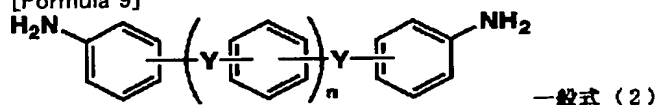


[0019] It comes out and 2 expressed, 2-screw (4-hydroxyphenyl) PUROPANJIBENZOETO -3, 3', 4, and especially 4'-tetracarboxylic dianhydride are desirable.

[0020] Moreover, as the acid 2 above-mentioned anhydride and a diamine component made to react, it is the following general formula (2).

[0021]

[Formula 9]



[0022] the inside of a formula and Y are the same — or — differing  $-C(=O)-$ ,  $-SO_2-$ ,  $-O-$ ,  $-S-$ , and  $-(CH_2)-$  — it is chosen out of m-,  $-NHCO-$ ,  $-C(CH_3)_2-$ ,  $-C(CF_3)_2-$ ,  $-C(=O)O-$ , or single bond — association is shown in a kind at least. m and n are or more 1 five or less integers. The diamine compound expressed especially screw (amino phenoxyphenyl) sulfone, and 1 and 3-screw (3-amino phenoxy) benzene are desirable. In addition, in a general formula (2), you may differ, even if two or more Y is the same between each repeat unit, and the hydrogen of each benzene ring may be suitably permuted by substituents various by within the limits which this contractor can consider. For example, although halogen radicals, such as hydrocarbon groups, such as a methyl group and an ethyl group, and Br, Cl, can be mentioned, it is not limited to these substituents. Furthermore, among the diamine compound expressed with a general formula (2), since the diamine compound which has an amino group in the meta position has the good solubility to the organic solvent of the thermoplastic polyimide which used it, the adhesive solution excellent in workability is obtained and it is desirable. In addition, two or more sorts may be mixed and used for the diamine compound expressed with a general formula (2).

[0023] The thermoplastic polyimide which dissolves in the polyimide system adhesives solution of this invention carries out the dehydration ring closure of the polyamide acid polymer which is the precursor, and is obtained. this polyamide acid solution — said acid 2 anhydride carried out and said diamine compound carried out — substantial — etc. — it is used so that it may become a mol, and in an organic polar solvent, a polymerization is carried out and

it is obtained.

[0024] This polyamide acid is obtained from the polyamide acid polymer which sets in the inert atmosphere of an argon, nitrogen, etc., is made to dissolve or diffuse a diamine compound and acid 2 anhydride in an organic polar solvent first, and is obtained.

[0025] especially the addition sequence of each component is not limited, but adds acid 2 anhydride previously into the organic polar solvent, adds a diamine compound, and is good also as a solution of a polyamide acid polymer — carrying out — some diamine compounds — the inside of an organic polar solvent — previously — optimum dose, in addition a degree — acid 2 anhydride — adding — the diamine compound of the remainder [ last ] — in addition, it is good also as a solution of a polyamide acid polymer. In addition, well-known various polymerization methods are in this contractor.

[0026] As an organic polar solvent used for the generation reaction of a polyamide acid solution For example, sulfoxide system solvents, such as dimethyl sulfoxide and diethyl sulfoxide, Formamide system solvents, such as N,N-dimethylformamide, N, and N-diethyl formamide, Acetamide system solvents, such as N,N-dimethylacetamide, N, and N-diethyl acetamide, Phenol system solvents, such as pyrrolidone system solvents, such as a N-methyl-2-pyrrolidone, a phenol, o-, m- or p-cresol, KISHINORU, a halogenation phenol, and a catechol, or hexamethylphosphoramide, gamma-butyrolactone, etc. can be mentioned. Furthermore, it can also use combining aromatic hydrocarbon, such as these organic polar solvents and xylenes, or toluene, if needed.

[0027] The dehydration ring closure of the polyamide acid polymer obtained above is carried out by the thermal or chemical approach, and thermoplastic polyimide is obtained. All of the chemical approach which dehydrates using the thermal approach and dehydrating agent which heat-treat a polyamide acid solution and are dehydrated as the approach of imide-izing are used. As a dehydrating agent by the chemical approach, an aliphatic series acid anhydride and aromatic series acid anhydrides, such as an acetic anhydride, are mentioned, for example. Moreover, as a catalyst, heterocycle tertiary amine, such as aromatic series tertiary amine, such as aliphatic series tertiary amine, such as triethylamine, and dimethylaniline, a pyridine, and an isoquinoline, is mentioned. The thermoplastic polyimide obtained as mentioned above can be used for preparation of the polyimide system adhesives solution of this invention as a solution as it is. Or although the solvent used for the polymerization of a polyamide acid is melted well, a polyimide solution is thrown in in the poor solvent which polyimide cannot dissolve easily, and after depositing polyimide resin, removing, refining and drying an unreacted monomer and considering as solid polyimide resin, it can also use for the adhesives solution of this invention suitably. As a poor solvent to be used, an acetone, a methanol, ethanol, isopropanol, benzene, methyl cellosolve, a methyl ethyl ketone, etc. are mentioned.

[0028] As the thermal approach, after carrying out the polymerization of the polyamide acid, it supplies in vacuum oven, for example, and imide-ization is performed by heating under reduced pressure, and the technique taken out as solid polyimide resin is mentioned.

[0029] As for the adhesive film of this invention, it is desirable that it is the adhesive film obtained from the adhesives which blended the epoxy resin with said thermoplastic polyimide further. It is desirable that it is the epoxy resin which dissolves in an adhesives solution. Bisphenol A mold resin, such as Epicoat 828 (oil-ized shell company make), Orthochromatic cresol novolak resin, such as 180S65 (oil-ized shell company make), Bisphenol A novolak resin, such as 157S70 (oil-ized shell company make), Tris hydroxyphenyl methane novolak resin, such as 1032H60 (oil-ized shell company make), The naphthalene aralkyl novolak resin of ESN375 grade, tetrapod FENI roll ethane 1031S (oil-ized shell company make), YGD414S (Tohto Kasei), tris hydroxyphenyl methane EPPN502H (Nippon Kayaku), Glycidyl amine type resin, such as special bisphenol VG3101L (Mitsui Chemicals), the special naphthol NC 7000 (Nippon Kayaku), TETRAD-X, and TETRAD-C (Mitsubishi Gas Chemical Co., Inc. make), etc. is mentioned as an example of representation.

[0030] the mixed rate of an epoxy resin — the resin solid content 100 weight section of thermoplastic polyimide — receiving — 1 — 50 weight section — 5 — 30 weight section is preferably desirable. When many [ when too few bond strength is low, and / too ], it is in the inclination inferior to flexibility and thermal resistance.

[0031] In this invention, it is desirable to blend the curing agent of an epoxy resin with the above-mentioned adhesives further. If it is generally used for the solution as a curing agent for epoxy resins as dissolution \*\*\*\*\*, it is good anything. A curing agent is added to an adhesives solution for [ , such as absorptivity, thermal resistance, and an adhesive property, ] improvement, and the common curing agent for [ , such as an acid 2 anhydride system, an amine system and an imidazole system, ] epoxy, an accelerator, or various coupling agents are mentioned typically.

[0032] As mentioned above, although explanation about each presentation of the polyimide system adhesives solution of this invention was given, the concentration of an adhesives solution is 15 — 30 % of the weight especially preferably ten to 40% of the weight preferably five to 50% of the weight in the amount of solid content (thermoplastic polyimide + epoxy resin + curing agent) which makes solution weight a denominator. Moreover, what is necessary is just to opt for the procedure of the dissolution etc. suitably in consideration of workability etc.

[0033] The approach of acquiring as an adhesive film of the polyimide film base which casts or applies the above-mentioned polyimide adhesives solution on the base material made from a high-polymer-film metallurgy group, casts or applies the method of tearing off and obtaining the adhesive film after desiccation from a base material or a polyimide system adhesives solution at least to one side of a polyimide film, dries it after that as an approach of obtaining the adhesive film for the FPC back up plate of this invention, and has a polyimide system adhesives layer on a front face for the FPC back up plate is mentioned. Although the adhesive film for the FPC back up plate which is obtained in the case of the former is a monolayer film of polyimide system adhesives, and this can be laminated

with a polyimide film and it can also be made the adhesive film for the FPC back up plate of the same configuration as the latter, as thickness of the polyimide system adhesives layer of the adhesive film front face for the FPC back up plate of the polyimide film base, 5 – 50 (it is because actual demand thickness is 35micromor50micrometer) mum is suitable anyway. When thickness is too thin, an adhesive property may fall, if thickness is too thick, desiccation removal of an organic solvent will become difficult, or foaming will arise.

[0034] The adhesive film for the FPC back up plate concerning this invention obtained as mentioned above has the property that it may be used suitable for the tape for TAB, a compound leadframe, the charge of a laminated wood, etc. Specifically low water absorption is shown, it excels in solder thermal resistance, and thermal resistance and an adhesive property are excellent, and in case it is used as adhesives, it can paste up at the temperature of about 250 degrees C or less.

[0035] The adhesive film for the FPC back up plate of this invention fits adhesion, when the metal back up plate used for the application of which high thermal resistance is required as the back up plate is used. Especially, the adhesive property of the cover-lay film in FPC and said metal back up plate is excellent, and it excels in the adhesive property at the time of using especially a polyimide film as a cover lay.

[0036] The adhesives for the FPC back up plate of this invention and used FPC with the back up plate are obtained by carrying out heating pressurization of a metallic foil or the metal plate at the cover-lay film side of a flexible printed circuit board, and pasting up through the above-mentioned adhesive film for the FPC back up plate. As a metallic foil or a metal plate, copper foil, a copper plate and aluminum foil, an aluminum plate and 42 alloy, an SUS foil, an SUS plate, etc. are mentioned, for example. Especially the class of FPC cover-lay film is not limited, for example, a polyimide film, polyester film, etc. are mentioned. On the occasion of use — the conventional polyimide system adhesives do not have an enough adhesive property to resin films, such as metals, such as copper foil, and polyimide, and the adhesive film for the FPC back up plate which it requires for this invention by the poor solubility although mixing with an epoxy resin was difficult has a good adhesive property with metallic foils, such as copper foil, or a polyimide film, and it can paste up at low temperature further — it excels in workability. When an example of the adhesion conditions in this case is given, they are about [ heating time 5–20 minute ] conditions whenever [ stoving temperature ] in 150 degrees C – 250 degrees C and pressure 0.1–10MPa.

[0037]

[Example] (Example 1) 2 and 2-screw (4-hydroxyphenyl) PUROPANJIBENZOETO -3, 3', 4, and 0.112 mols (henceforth ESDA) of 4'-tetracarboxylic dianhydride were added gradually, having added 3 and 3'-screw (amino phenoxyphenyl) sulfone (henceforth BAPS-M) 0.112mol to the glass flask with a capacity of 1000ml at dimethylformamide (henceforth DMF) 263g, and stirring under nitrogen-gas-atmosphere mind. It stirred for 30 minutes under the ice bath, stirring was stopped in the place where viscosity reached 1500poise(s), and the polyamide acid solution was obtained. After adding DMF113g, beta-picoline 26g, and 45g of acetic anhydrides to this polyamide acid solution and agitating for 30 minutes, it agitated for 1 hour and was made to imide-ize under 100 more degrees C. Then, this solution was hung down little by little into the methanol agitated at high speed. The mixer ground the yarn-like polyimide which deposited in the methanol, the methanol performed Soxhlet washing, it was made to dry at 110 degrees C for 2 hours, and polyimide powder was obtained.

[0038] The polyimide powder obtained above was added to 20g, Epicoat 1032H60 (oil-ized shell company make) were added to 102g THF, it stirs,g [ 5 ], 4, and 4'-diamino diphenyl sulfone (curing agent) 1.5g was dissolved, and the polyimide system adhesives solution was obtained (solid-content concentration: SC=20%). On the PET film, it casts and stoving of the polyimide system adhesives solution was carried out for 170# C or 10 minutes so that it might be s t to 35 micrometers after desiccation, and the adhesive sheet was obtained.

(Example 2) Polyimide powder was obtained like the example 1 except using 1 and 3-screw (3-amino phenoxy) b nzene as diamine. The adhesive sheet was obtained like the example 1 using the obtained polyimide powder.

(Example 3) The polyamic acid solution was obtained like the example 1. It carried out in vacuum oven and heating under reduced pressure of the 300g of this polyamide acid solution was carried out by the pressure of 5mmHg by 200 degrees C for 3 hours for the bat which carried out the Teflon (trademark) coat for 180-degree-C 1 hour for 150-degree-C 1 hour. The adhesive sheet was obtained like the example 1 using the obtained polyimide resin.

(Example 4) The adhesive sheet was obtained in the same procedure as an example 1 except having used 1,4-dioxane instead of THF as an organic solvent.

(Example 5) The adhesive sheet was obtained in the same procedure as an example 1 except having used dioxolane instead of THF as an organic solvent.

(Example 6) The polyimide powder obtained in the example 1 was added to 20g, naphthalene ARAKIRU novolak resin ESN-375 (the Nippon Steel chemistry company make) was added to 102g THF, it stirs,g [ 5 ], 4, and 4'-diamino diphenyl sulfone (curing agent) 1.5g was dissolved, and the adhesive sheet was obtained.

(Example 7) The polyimide powder obtained in the example 1 was added to 20g, biphenyl type epoxy resin NC3000P (Nippon Kayaku Co., Ltd. make) were added to 102g THF, it stirs,g [ 5 ], 4, and 4'-diamino diphenyl sulfone (curing agent) 1.5g was dissolved, and the adhesive sheet was obtained.

(Example 1 of a comparison) The plater bond M1276 (copolyamide, the Japanese Lil Sun Co., Inc. make) was dissolved in 10g, and 1g was dissolved [ Epicoat 828 (oil-ized shell company make) ] for 20g and a diamino diphenyl ape phon in 83g DMF. The obtained varnish was cast on the PET film, it dried at 150 degrees C for 10 minutes, and the adhesion sheet with a thickness of 35 micrometers was obtained.

(Example 2 of a comparison) Polyimide powder was obtained like the example 1 except making an acid 2 anhydride component into benzophenone tetracarboxylic dianhydride (BTDA). This polyimide powder did not dissolve in THF,



1,4-dioxane, 1, and 3-dioxolane.

[0039] (Example 3 of a comparison) Polyimide powder was obtained like the example 1 except using an acid 2 anhydride component as pyromellitic acid 2 anhydride (PMDA), and using a diamine component as diamino diphenyl ether (ODA). This polyimide powder did not dissolve in THF, 1,4-dioxane, 1, and 3-dioxolane.

[0040] (Characterization of the adhesive film for the FPC back up plate) The following procedures performed characterization of the adhesive film for the FPC back up plate.

- Through the adhesive film for the production FPC back up plate of the sample for valuation, heating pressurization of 25-micrometer polyimide film (APIKARU 25AH, Kaneka Co., Ltd. make) and the cleaning processing aluminum plate was carried out for 20 minutes by the temperature of 200 degrees C, and pressure 3MPa, and the polyimide film with the back up plate was obtained.

(Lengthening and removing strong measurement) It lengthened when lengthening the polyimide film of the obtained polyimide film with the back up plate to a direction 90 degrees, and removing it, and removed, and reinforcement was measured in autograph S-110-C (Shimadzu Corp. make). However, film width was measured by 3mm.

(Evaluation of solder thermal resistance) Bulging does not have the appearance evaluation when being immersed in 260-degree-C solder bath for 10 seconds, and solder thermal resistance made the good thing O.

[0041] The characterization result of the adhesive film for the FPC back up plate of an example and the example of a comparison is shown in Table 1.

[0042]

[Table 1]

	引き剥し強度 (N/cm)		半田耐熱性
	初期強度	150°C, 1000時間後	
実施例 1	10.0	9.2	○
実施例 2	11.0	10.4	○
実施例 3	10.0	9.3	○
実施例 4	10.0	9.0	○
実施例 5	10.2	9.4	○
実施例 6	8.5	8.5	○
実施例 7	12.2	11.4	○
比較例 1	10.5	0.1	×

※比較例 2～3 はエーテル系溶媒に不溶であったため、評価用サンプルが得られなかった。

[0043]

[Effect of the Invention] The adhesive film for the FPC back up plate of this invention can be pasted up at the temperature of about 200 degrees C. Unlike the conventional heat-resistant adhesives, adhesion does not take an elevated temperature, but high adhesive strength is shown also to a polyimide film, and high adhesive strength is held to an elevated temperature. There is also no fall of the adhesive property after 1000-hour neglect 150 more degrees C, and it excels in thermal resistance over a long period of time. Moreover, it has the solder thermal resistance which does not produce bulging at the time of being immersed in a solder bath etc. As mentioned above, utility value is very high industrially as an adhesive film for the FPC back up plate which requires high-reliability and thermal resistance.

[Translation done.]